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EQUINE PERNICIOUS ANÆMIA.

Sir Arnold Theiler has discovered the existence of this disease—or, as it is sometimes called "infectious anæmia"—in South Africa. This confirms the view already held by pathologists that the disease has a much wider geographical distribution than is yet realised. For a long time it was only observed in France, especially, in the north-eastern districts. It has also been seen, though not to the same extent, in Switzerland, Germany, and Hungary. What appears to be the same disease—though this is not absolutely certain—has been seen with increasing prevalence for more than thirty years past in the United States and Canada, where it is known as "swamp fever." Similarly, there may still be some little doubt whether the South African disease is identical with the American and European ones; but the great probability is that all three are one and the same condition. In that case the discovery is rather a serious one for South Africa; for the diagnosis, prevention, and treatment of the disease are all full of difficulty. Further, its occurrence in Africa increases the probability that we do not yet know its full extent. It may exist undiscovered in many other parts of the world, and perhaps even in these islands.

SWINE FEVER.

Swine fever has increased at a tremendous rate this year. There have been over 1500 more outbreaks than there were in the corresponding period last year; speaking roughly, the proportions of the two periods are about 12 to 7. The disease has always been marked by unaccountable fluctuations in its prevalence, and the present increase may be one of them—but the position cannot be called satisfactory.

Perhaps its worst feature is the quiet acceptance by the profession of our present failure to check the disease. Veterinary surgeons have apparently made up their minds that swine fever will be with us until—or unless—an effective serum against it can be found; at least, no one seems able to suggest any amendment in our methods of dealing with it, though many men must have thought over the subject. Probably their silence is due to belief in Sir George Brown's old maxim—"Nothing short of cattle plague regulations will stamp out swine fever," and a doubt whether public opinion would permit such regulations. We agree with the maxim; but we are not sure that the doubt is justified. The present is not the time to commence a campaign upon the subject; but we think that if one were started in a year or two, the public might be induced to see that our present system is really a false economy of money and trouble alike.

OSTEOMATA OF THE DURA MATER (SO-CALLED OSSIFYING SPINAL PACHYMENINGITIS OF THE DOG).

Prof. Petit, of Alfort, has published (*Soc. Cent. de Méd. Vét. de Paris*) a histological study of the osseous lesions which are nearly always encountered in the sub-medullar region of the dura mater of dogs which, during life, have presented the symptoms which are generally regarded clinically as those of a chronic pachymeningitis. Petit's studies show that these lesions are *not* the result of an exudate, and that consequently an inflammation of the dura mater is not present.

Petit's conclusions may be summarised as follows:—

1. We are ignorant of the pathogeny of the needle-like and plate-like osteomata of the dura mater, as we are also of that of the majority of osteomata in general.

2. Contrary to the classic opinion, these osteomata, which result from a slow transformation of fibrous tissue, have no correspondence whatever to a pachymeningitis.

3. Contrary to the view which has always been affirmed, these osteomata, in the immense majority of cases, play no appreciable pathological *role*.

A Belgian critic contests the last of these three conclusions, for the following reasons.

If it is true, as Petit affirms, that these osseous productions do not compress the spinal cord, it must nevertheless be admitted that, being situated on the floor of the spinal canal, the dura mater that contains them forms a very irregular bed for the spinal cord, and that their thickness, which is sometimes rather considerable, produces a raising of the spinal cord and dragging upon the nerve roots. The same result is obtained in the case of exuberant ossification of the intervertebral discs. Moreover, clinicians concerned with canine practice, basing their diagnosis upon a chain of symptoms common to the two diseases, recognise very well the disease hitherto designated as ossifying spinal meningitis, which cannot be distinguished during the life of the animal from ossification of the intervertebral discs. The post-mortem examination nearly always confirms the diagnosis.—(*Annales de Méd. Vét.*)

MILIARY TUBERCULOSIS IN A HORSE.

Will, a district veterinary surgeon of Waldkirchen, reports the case of a powerful eight-year-old working horse which, though eating well, visibly lost condition for some weeks without any demonstrable cause. The symptoms of broken wind then suddenly appeared. Examination revealed no fever at that time; there was no nasal

discharge, and no cardiac affection could be demonstrated. Similarly, pulmonary emphysema was not demonstrable. Both appetite and digestion were normal.

After about eight or ten days a severe bronchitis, with a temperature ranging from 104° F. to 105·8° F., set in. A few days later the temperature sank to 102° F., but rose again after twenty-four hours to over 104° F. The temperature then fluctuated repeatedly in the same manner. The appetite was quite suspended from the first appearance of fever onwards, and did not return even during the periods of lower temperature. The author suspected some incurable internal organic disease, and therefore had the horse destroyed.

Post-mortem examination revealed acute miliary tuberculosis of the lungs. The spleen also contained about ten tuberculous abscesses, ranging from a millet-seed to a pea in size.—(*Münch. Tier. Woch.*)

Cerebral Amaurosis of Both Eyes.

Kaden records (*Zeit. f. Chirurgie*) the following case of a remount horse. The animal, who was somewhat difficult to ride, fell upon his right side at exercise, and struck his head violently against the ground. He remained lying motionless for a short time, then began to struggle with all four limbs and made attempts to rise, which, though he was assisted, were unsuccessful. Then sweating appeared over the whole body, together with forced pumping breathing. After another fifteen minutes the horse, with assistance, managed to rise; but the movements, especially those of the hind limbs, were so uncertain that equilibrium was only maintained with great difficulty.

When brought into the stable, the animal stood with the hind limbs straddling and the head and neck bent somewhat towards the left. The left eye was fixed in aspect, and turned somewhat outwards upon its logitudinal axis. Eating and drinking were accomplished regularly and satisfactorily.

During the succeeding days the oblique direction of the head and neck became still more marked. Disturbances of movement still persisted, but not to the same degree as after the fall. On the left side of the neck were seen two transversely running and exceedingly painful swellings, which rendered the turning of the head to the right very difficult. By degrees the gait became more free, but the obliquity of the head and neck increased.

After eight days the behaviour of the horse with regard to obstacles caused an examination of the eyes to be made. It was then found that the left eye was completely blind, while the power of vision of the right one was considerably impaired. The left pupil was widely dilated, and completely reactionless to light. The right pupil showed a slight reaction to light. The transparent parts of the eyeball showed no lesion.

Treatment consisted in the administration of 5 grammes (=about 1¼ drachms) daily of potassium iodide for a period of three weeks. Gradual improvement of the eyesight appeared upon this treatment. The pupils reacted again; and after six months the power of vision was again normal. The oblique holding of the head and neck persisted, but only in an insignificant degree.

The author's view is that the condition was caused by an effusion of blood in the brain in consequence of the fall, and that the symptoms disappeared as the extravasation of blood was gradually re-absorbed.—(*Münch. Tier. Woch.*)

The Action of Cymarin.

Dr. Marie Elise Schubert has published (*Therap. Zentral.*) an article upon this subject. According to her investigations, cymarin is the active principle of the fluid extract of *Apocynum cannabinum indicum*. Pharmacologically, in its action upon the heart, cymarin occupies an intermediate position between caffeine and the digitalis bodies, with a special approximation to the latter. Dr. Schubert considers it worthy to rank alongside digitalis, especially as its posology can be more accurately estimated.

In man, the diuretic effect of cymarin seems to be strongest when it is given intravenously. The effect on the heart is that the pulse becomes fuller, slower, and more powerful; and difficulty of breathing disappears. The author has not seen any injurious effects from the drug, while she has repeatedly seen it succeed in cases in which caffeine and digitalis had failed.—*Münch. Tier. Woch.*)

Intraperitoneal Injection of Collargol in Diffuse Peritonitis.

Dr. R. Jelke recommends (*Münch Mediz. Woch.*) this treatment for diffuse peritonitis. He injects from 30 c.c. to 50 c.c. of a 2 per cent. solution of collargol, and advises the repetition of the injection on the following days. The collargol causes no especial irritation of the peritoneum, and is rapidly absorbed from the abdominal cavity by the peritoneum. In this process it follows the same route as the infective material, the pathogenic action of which it can thus influence.—(*Munch. Tier. Woch.*)

W. R. C.

JOHNE'S DISEASE.*

By A. Leslie Sheather, B.Sc., M.R.C.V.S.,
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The name has been generally adopted by English authors to designate the form of chronic enteritis which is due to the multiplication in the wall of the intestine and in the mesenteric glands of a particular acid-fast bacillus. The name has been given to commemorate the fact that in 1895 Johne and Frothingham first drew attention to the presence of this bacillus in the lesions, although they were in error regarding the nature both of the disease and of the causal organism. These authors, however, gave an accurate description of the macroscopic and microscopic lesions of the disease.

Nine years later Markus published a paper in which he showed that the lesions characteristic of the disease had been recognised in Holland for some years previously, and particularly by Koorevaar.

* Presented at the Tenth International Veterinary Congress, London, 1914.

Markus first described the method of *intra vitam* diagnosis of taking fragments of the mucous membrane of the rectum and staining preparations made from these for acid-fast bacilli.

During the period 1904-1906 a number of references appeared in veterinary literature regarding the occurrence of the disease in different parts of the continent of Europe and confirming the presence of acid-fast bacilli in the lesions. All the authors agreed that the bacillus could not be cultivated upon artificial media, that the infection could not be transmitted experimentally to laboratory animals, and that the bacillus represented a specially avirulent form of the tubercle bacillus.

In 1906 Bang established the important fact that the condition is separate and distinct from tuberculosis. He showed that it existed in Jersey cattle that were free from tuberculosis. Further, he was successful in transmitting the disease to calves experimentally by administering the mucous membrane from a piece of diseased bowel by the mouth.

At Liverpool, in 1906, Bang predicted that the disease would be discovered in England and the following year this prediction was verified by the publication of the records of four cases of the disease by M'Fadyean. This paper gave the post-mortem findings of each case and confirmed the accounts given by previous authors of the distribution, macroscopic and microscopic characters of the lesions, the morphological characters of the bacilli, and the clinical features of the disease. Attempts to infect rabbits and guinea-pigs and to cultivate the bacillus outside the body failed. It was in this paper that the suggestion that the disease should be termed Johne's disease was put forward on the ground that the name suggested by Bang, viz., chronic bovine pseudo-tuberculous enteritis was too cumbrous for ordinary use, and tended to keep alive the erroneous idea that there was some connection between the disease and tuberculosis.

In the same year M'Fadyean recorded the occurrence of the disease in a deer, and suggested that the sheep might also prove to be susceptible. In 1908 Horne recorded the occurrence of the disease in Norway. In the same year Bugge and Albien published a short statement to the effect that they had succeeded in cultivating the bacillus, but no details of the method were given. In 1910 Albien published a further note giving the composition of the medium used, but the results remained unconfirmed. During the same year reports regarding the occurrence of the disease in the United States were published by Pearson.

It was stated by Myer and Kolles that they had been able to arrive at a positive diagnosis in 60 per cent. of cases by applying the method suggested by Markus.

In 1909 O. Bang drew attention to the fact that in a proportion of cases infected animals reacted to the subcutaneous injection of tuberculin prepared from avian tubercle bacilli, and that an opinion might be based upon such reactions, provided that it was known that the animals were free from tuberculosis.

The foregoing is a brief account of the work done in connection with Johne's disease up to the time of the last International Veterinary Congress. Since that date important progress has been made in the study of the disease.

In 1911 Twort published what appears to be the first definite success in the cultivation of the bacillus outside the body in the "Proceedings of the Royal Society, Series B, vol. 83, 1911, and amplified his observations in a paper in the same journal the following year.

The author was working upon the cultivation of another acid-fast bacillus, the bacillus of human leprosy, and the methods which proved to be successful in that case were applied to the cultivation of the bacillus of Johne's disease. The main feature of the method was the addition to culture media of dead bacilli of allied types, with the object of supplying some substance which appeared to be necessary for growth, but which was either lacking in ordinary culture media, or which the bacillus had not the power of building up from the elements present in such media.

For this purpose tubercle bacilli of the human type were mixed with glycerine and saline solution and killed by steaming, the mixture being added to egg medium. The mixtures were made in the following proportions:

Egg	75	parts.
0·8 per cent. salt solution	25	"
Dead tubercle bacilli	1	"
Glycerine ...	5	"

This was distributed to tubes and, to lessen the risk of contamination, these were sterilised by the intermittent method at 60° C. for one hour on three successive days, and then inspissated on a water bath.

The seed material was prepared from diseased intestines by placing fragments of the mucous membrane in a 1 per cent. solution of ericolin and incubating them at 37° C. for an hour. This had the effect of killing organisms other than the bacillus of Johne's disease.

There was visible growth upon the medium described in about three weeks. Subcultures were also obtained upon the medium, but no growth took place upon ordinary media.

In Twort's original communication the bacilli in primary cultures were said in many cases to show long forms with branching and clubbed formations. The hope that it would be found possible to prepare a vaccine for diagnostic purposes was expressed.

In the second communication to the Royal Society a further contribution to the question of the cultivation of the bacillus was published by Twort and Ingram. They found that if instead of using human tubercle bacilli in their media a bovine strain was used no growth took place, even when the medium was tried with strains of the bacilius which had been growing upon artificial media for a year. Avian tubercle bacilli were also found to be unsuitable, as only a small amount of growth developed upon media containing this organism. The best results were obtained with media containing the *Bacillus phlei*. A slight growth was visible in cultures upon this medium in a week. The smegma bacillus of Moeller and the "nasenschleim" bacillus of Karlinski gave positive results, but Dubard's tubercle bacillus of fish gave negative results.

This paper contains the description of the attempts made by the authors to isolate the "essential substance' from the tubercle bacilli. They found that the "essential substance" could be extracted from the *B. phlei* by hot ethyl alcohol. On cooling, a precipitate was thrown down which was filtered off, the liquid was allowed to evaporate and then extracted with hot and cold chloroform. There remained a liquid insoluble in chloroform, but soluble in water. Media containing the latter substance yielded the best results. In a monograph published in 1913 these results were amplified.

Although success attended the efforts of the authors to obtain extracts containing the "essential substance" from the acid-fast bacilli, they were unable to identify it. Their experiments lead them to believe that the substance is in the nature of an organic acid, but they were unable to discover an efficient substitute for it.

In May, 1912, Holth published in the *Zeitschrift für Infektionskrankheiten, parasitäre Krankheiten und Hygiene der Haustiere*, vol. xii, No. 5, pp. 378-387, an account of some experiments in the cultivation of the bacillus.

Cultures were made upon a number of media, some containing dead tubercle bacilli, including the medium described by Twort, and others not containing any tubercle or other acid-fast bacilli. No growth took place on the latter. The best results were obtained with a medium consisting of blood serum with a quarter of its volume of liver broth, 2 per cent. dead tubercle bacilli, and 4 per cent. glycerine, solidified by heating to 85° C. The whole surface was covered with visible growth in six weeks.

The presence of dead acid-fast bacilli in the media being open to objection, a glycerine extract of the bacilli was used instead. The extract was prepared by heating a mixture of the bacilli with glycerine to 100° C. for an hour and allowing the mixture to stand for several days. The addition of 5 per cent. of this extract was found to fully replace the dead bacilli. Positive results were also obtained with liquid media containing glycerine extracts of tubercle bacilli. A bottom growth was obtained in the form of clumps of bacilli, the broth remaining clear. Surface growths were also obtained.

A number of attempts to get the bacillus to grow upon media containing no glycerine extract failed.

In the course of an article published by M'Fadyean, Sheather, and Edwards, in the *Journal of Comparative Pathology and Therapeutics*, vol. xxv, No. 3, Sept., 1912, the authors record their experiments in the cultivation of the bacillus which were started early in the previous year. At first the medium, which was exclusively used, was that recommended by Twort and Ingram, but in all cases Uhlenhuth's antiformin was used in the place of ericolin for the destruction of contaminations in the seed material. The antiform was, and is still, used in a 20 per cent. solution in distilled water, the mixture being allowed to stand for half an hour. After centrifugation the sediment was washed twice with sterile distilled water.

Proceeding in this way the authors had isolated at the time of writing twenty-three strains of the bacillus from natural cases and four from animals infected experimentally.

Working independently of Holth, the authors found that glycerine extracts of tubercle bacilli used instead of the bacilli themselves yielded positive results, and the best results were obtained with an extract prepared by adding 20 per cent. glycerine in distilled water to tubercle bacilli cultivated upon the surface of glycerine broth in the proportionate volumes of 2 to 1. This mixture was heated to 115° C. in an autoclave and centrifuged after it had been cooled down, giving a clear faintly yellowish liquid.

The glycerine extracts were made with living, dead, washed and unwashed bacilli, but no difference could be detected in the results obtained.

By the addition of this extract to ordinary agar or serum before solidification, and to broth it was found to be possible to get media suitable for the cultivation of the bacillus.

Other methods successfully employed were: the preparation of 2 per cent. agar from broth composed of equal parts of 5 per cent. glycerine broth and broth from a flask in which a good growth of the tubercle bacillus had been obtained, the latter having been sterilised by steaming. The addition of 10 per cent. of ox serum to this agar medium before sloping the tubes yielded a medium somewhat inferior to agar containing the glycerine extract. It was found that if the bacilli were separated from the broth by filtration through a porcelain filter, instead of centrifugation, the medium was rather less suitable for the cultivation of the bacillus. Tubercle bacilli of the avian type supplied extracts which yielded the best results. Bacilli of the human and bovine types gave results only slightly inferior, and bacillus phlei was found to be the least suitable for addition to media.

In primary cultures incubated at 37° to 38° C. growth generally became visible to the naked eye in about four weeks. The growth developed in the form of little round slightly raised whitish colonies. In many primary and subcultures there subsequently developed large secondary colonies projecting freely above the surface of the medium. These colonies were either regular or irregular in shape, opaque, and of a yellowish-white colour. That these secondary colonies were actually composed of the bacillus of Johne's disease and were not in the nature of accidental contaminations was verified by microscopic and cultural examination. In subcultures a continuous slightly wrinkled layer of growth was generally obtained.

When slightly magnified and examined by transmitted light, colonies upon agar containing glycerine extract were found to have a central opaque portion in which no details could be made out, surrounded by a zone presenting a ragged appearance, suggesting a tangled felt-like structure. Cultures were obtained upon liquid media consisting of ordinary broth with the addition of extract of tubercle bacilli or of *B. phlei* and also upon a mixture of ordinary veal broth and an equal volume of the liquid obtained by steaming and centrifuging broth upon which a good growth of tubercle bacilli had been obtained.

On liquid media the growth develops in the form of a thin translucent pellicle which subsequently develops opaque white areas of irregular shape, due to a marked increase in the thickness of the growth.

In volume 67 of the *Centralblatt für Bakteriologie*, 1913, a paper by Twort and Ingram contains the results of their further investigations into the nature of the essential substance, and they conclude that the medium upon which the acid-fast bacillus to be extracted is grown plays a considerable part in the production of the "essential" substance. They found that *B. phlei* grown upon liver broth was inferior to that grown upon peptone beef broth.

The authors confirm their opinion that the bovine tubercle bacillus does not lend itself to the preparation of a medium suitable for the cultivation of the bacillus of Johne's disease.

In this paper they also report the success of obtaining subcultures of a single strain of the bacillus in glycerine peptone liver broth containing no extract of acid-fast bacilli. They also obtained surface growths upon glycerine broth containing extracts of human tubercle bacilli, and found that the addition of filtered ascitic fluid added to agar medium containing extract of the tubercle bacillus improved it.

Animals susceptible to the Disease. Up to the date of the last International Veterinary Congress the occurrence of the disease had been definitely established in the ox and deer. Since that date it has been recorded in the sheep by Stockman and M'Fadyean, and apart from these published cases M'Fadyean has been able to establish a positive diagnosis in some eight or nine other sheep, and has also encountered a case in the buffalo, and one possible case in the horse.

In the *Annales de Médecine Vétérinaire*, vol. lxii., No. 4, April, 1913, p. 197, Liénaux describes a case of enteritis in a horse which he diagnosed as Johne's disease. The diagnosis appears to have been based solely upon the microscopic examination of the fæces and of preparations made from the intestines and mesenteric glands. In view of the fact that some of the intestinal glands were entirely caseous and the intestinal mucous membrane was closely beset with ulcers, there appears to be some doubt whether the case was in reality one of Johne's disease.

Experimental Infection. All authors are agreed that the disease is not transmissible to the small laboratory animals. Before the cultivation of the bacillus outside the body was an established fact, it was found to be possible to transmit the disease to bovine animals by feeding them with the mucous membrane taken from diseased animals (Bang), and by intravenous inoculation with material from diseased mesenteric glands (Meissner and Trapp).

In November, 1911, Twort and Ingram reported the successful inoculation of bovine animals with Johne's disease. Six animals were inoculated, two intravenously, one intraperitoneally, and one was given culture by the mouth. The remaining two animals are not taken into consideration as they died shortly after infection. When these animals were killed from five to twelve months later, two were found to be infected with Johne's disease, and these and one of the others also had tuberculous lesions. In both cases the lesions of the former disease were slight and only a few bacilli could be found.

In September, 1912, the same authors reported success in their experiments regarding the infection of calves by inoculation and feeding with pure cultures, and of goats by intraperitoneal and subcutaneous inoculation.

Five calves were inoculated, two intravenously, two intraperitoneally, and one subcutaneously, with cultures isolated from the intestine of a calf which had been infected experimentally by inoculation with pure culture. Six months later these calves were tested with a special diagnostic agent, and the results obtained will be referred to later.

A few days after the test they were killed. One was found to have typical lesions of Johne's disease, and bacilli were detected in them. No. 2 had slight lesions of Johne's disease in the intestines and several acid-fast bacilli were found. This animal and the preceding one were free from tuberculosis. No. 3 had typical tubercular bronchial glands and was not found to be infected with Johne's disease. No. 4 showed bronchial tuberculosis and moderately advanced Johne's disease. No. 5 had tuberculosis of the bronchial glands and a tuberculous lesion in one lung. There were no visible lesions of Johne's disease, but a few bacilli were found in the mucous membrane of the intestine near the ileo-cæcal valve and several in a mesenteric gland. Positive results attended cultivation experiments in every instance except in the case of calf 3.

In the same paper the authors record the successful inoculation of two goats by intravenous and intraperitoneal inoculation. These animals will again be referred to under the heading of diagnosis.

The distribution of the bacillus in the bodies of infected animals. In natural cases the organism has not been encountered elsewhere than in the substance of the mucous membrane and submucous coats of the small and large intestines, and in the mesenteric and colic glands. The bacilli have been detected in the fæces. The proportionate distribution of the bacilli in the different parts of the intestine varies from case to case. Sometimes the large intestine is more severely invaded than the small, and not infrequently bacilli are most numerously present in the mucous membrane of the cæcum. It is, however, a general rule that the part most seriously involved is the terminal third or quarter of the small intestine. That the bacilli may be found in large numbers about the middle and even further forward in the small intestine is shown by the charts given in the paper by M'Fadyean, Sheather and Edwards published in 1912. It may also be seen that in cases where the invasion is very severe in the terminal portion of the small intestine bacilli may be found at places within 10 or 15 feet of the pylorus.

There is not always a relationship between the extent of the macroscopic lesions in the intestines and the numbers of bacilli present.

Diagnosis.

The first published account of a method of diagnosis during life is that of Markus in 1904. The method described was to pinch or scrape off a fragment of the mucous membrane of the rectum, using the fragment so obtained to prepare films for microscopic examination. In 1908, Myer and Kolles stated that they had been able to establish a diagnosis in 60 per cent. of cases by the examination of rectal scrapings and fæces.

In 1909, O. Bang published his observations regarding the diagnosis of the disease by means of avian tuberculin. In this publication Bang draws atttention to the fact that infected animals do not react to ordinary tuberculin, even though very large doses are injected. He also states that B. Bang attempted to prepare a diagnostic agent by extracting intestinal mucous membrane of heavily infected animals with a solution of glycerine. The material thus prepared failed to provoke reactions which could be considered as satisfactory. In his first experiments a calf which had been fed with infected mucous membrane and a naturally infected cow were tested. The calf gave a reaction resembling a typical tuberculin reaction, and the cow failed to react.

Subsequently the author repeated his experiment by injecting 20 gr. of avian tuberculin into two naturally infected cows derived from a tubercle-free herd. In both animals there was a rise of temperature, in one from 39° to 40° C., and in the other from 39·1° to 39·9° C. One animal died seven months later and was found to be seriously affected, and the other was still living at the time of writing, but immense numbers of bacilli could be found in fragments of rectal mucous membrane. It was observed that the reaction was liable to produce some systematic disturbance—loss of appetite, decrease in the amount of milk secreted, and in many cases marked diarrhœa. Healthy animals gave no evidence of reaction, and animals in an advanced stage of the disease may fail to react.

In twenty cases the post-mortem examination confirmed the diagnosis. In three large tubercle-free herds, where the disease had been responsible for the deaths of 10 per cent. of the animals, about 33 per cent. of the cows reacted. There were on one farm, in addition to the cows, fifty-eight animals of from one to two years old, and of these only four reacted.

The author draws attention to the fact that difficulty arises in the case of herds not free from tuberculosis, because avian tuberculin is capable of causing a rise of temperature in animals affected with tuberculosis as in animals affected with Johne's disease.

In the *Veterinary Journal* for June, 1911, Male published the results of a number of tests carried out with avian tuberculin supplied by Stockman.

Two heifers and two cows out of a herd comprising a bull, ten cows, and eight heifers and calves, gave reactions showing elevations of temperature of from 1·8° to 3·6° F. These animals had all failed to react to the ordinary tuberculin test, and when slaughtered were found to be infected. In the three giving the highest reactions bacilli were found, and in the animal which showed a rise of 1·8° F. the bowel showed the lesions of Johne's disease, but the bacilli were not discoverable by microscopic examination.

In another instance the test was carried out by Male with avian tuberculin on a herd of 32 Jersey cows. Five gave positive reactions and in one case the reaction was classed as doubtful. The author was unable to verify the diagnosis in these animals.

Two further suspected animals were tested in the same way and neither reacted. On post-mortem examination no bacilli could be found.

In the *Proceedings of the Royal Society*, Series B, 1911, Nov. 7, Twort and Ingram published their experiments and observations regarding the preparation of a specific diagnostic agent from Johne's bacillus.

Their first vaccine (No. 1) was prepared from alkaline peptone broth containing 4 per cent. glycerine and 1 per cent. dried human tubercle bacilli. Flasks of this medium were inoculated with culture, and a small amount of growth in the form of small yellowish-white grains was obtained at the bottom of the liquid after two months' incubation. The flasks were sterilized by steaming and the liquid filtered. Other batches of vaccine were prepared by substituting dried timothy bacilli (No. 2), or a glycerine saline extract of the timothy bacillus (No. 3) for the human tubercle bacilli and also by scraping growth off egg media containing timothy bacilli and making an emulsion of this with the timothy extract broth cultures (No. 4). A fifth batch of vaccine was prepared by suspending the growth obtained upon solid media in 0·8 per cent. salt solution.

The four experimentally infected animals already referred to in the section dealing with experimental infection were injected with vaccine No. 1 in doses of 2½ and 5 c.c. from four to seven months after infection. In the tabular statement of the experiment given in the paper, it is indicated that the result was positive in three instances and doubtful in the fourth. No temperatures are given. Three of the animals, including the one giving the doubtful reaction, were injected with tuberculin a month later, and two are stated to have reacted. After a further interval of a month they were tested with a vaccine prepared from *B. phlei* and none reacted. A similar result was obtained when they were tested with avian tuberculin in doses of 5 to 8 c.c. nine days later. The animal which gave a doubtful reaction to vaccine No. 1 failed to react to vaccine No. 4, and the other two failed to react to vaccine No. 5. Three uninfected control calves were used. Some or all of these were tested with vaccine No. 1 tuberculin, vaccine of *B. phlei*, and avian tuberculin. The only positive reaction obtained was with tuberculin in one of the animals.

A naturally infected bull failed to react either to vaccine No. 1, avian tuberculin, or to vaccine No. 4. The doses in these instances were 10, 8 and 10 c.c. respectively.

Attention is drawn to the fact that vaccine No. 1, with which the positive results were obtained, was prepared from a medium containing the tubercle bacillus, and that as the calves were found to be tuberculous this was probably responsible for the reactions. In September, 1912, Twort and Ingram published in the *Veterinary Record* a further note regarding the preparation of a diagnostic vaccine. In this instance the medium used was derived from a nine month's old culture of the bacillus upon glycerine peptone broth containing glycerine-saline extract of *B. phlei*. This vaccine was injected intravenously into three adult bovines and five calves in doses of 5 to 10 c.c. The three adult animals were all clinically affected and had failed to react to ordinary tuberculin. The animals' tempera tures were normal at the time of injection and the maximum temperatures recorded ranged from 104·8 to 106·1° F. in from one to five hours after injection. The five calves upon which the vaccine was tested were those already referred to under the heading of experimental infections.

No. 1.—The temperature rose to 104·6° F. in three hours. Found to be infected on post-mortem.

Nos. 2 and 3.—No rise of temperature up to the sixth hour after which, owing to an error, no temperatures were taken. No. 2 found to be slightly affected. No. 3 was tuberculous and not infected with Johne's disease.

No. 4.—Temperature rose to 105·6° in six hours. Found to be infected with tuberculosis and Johne's disease.

No. 5.—No rise of temperature during ten hours after injection, but temperature found to be 105·4° F. twenty-four hours after injection. Animal found to be tuberculous, but no evidence of infection with Johne's disease, save that a few bacilli were found near the ileo-cæcal valve and in a mesenteric gland.

Cultures were obtained from all except No. 3.

Two goats which the authors infected experimentally were tested with the same vaccine. The maximum temperatures recorded were 106·6° and 105·4° F. at the ninth and tenth hours respectively.

The authors conclude that they have prepared a specific diagnostic vaccine which will enable stock-owners to eradicate the disease from their herds, and they advocate compulsory slaughter without compensation.

In the paper by M'Fadyean, Sheather, and Edwards, published in the *Journal of Comparative Pathology and Therapeutics* for September, 1912, records are given of a number of animals sent to the Royal Veterinary College for observation. Where possible, attempts were made to arrive at a diagnosis during life, adopting the plan described by Markus in 1904, and by the use of various kinds of tuberculin tests. In every case the presence of Johne's disease was verified by post-mortem examination. Microscopic examination was made of fæces, and films were made from fragments of the rectal mucous membrane of a number of these animals.

Out of fifteen examinations of fæces, acid-fast bacilli were detected upon six occasions. Preparations of the rectal mucous membrane were examined on fourteen occasions and acid-fast bacilli were discovered in eight instances.

Fourteen of the animals were subjected to subcutaneous tuberculin tests with avian tuberculin, the dose administered being 8 c.c., and in all nineteen tests were carried out.

In the majority of cases the temperatures were taken every third hour from the time of injection until the fifteenth hour and again at the twenty-fourth.

The elevations of temperature recorded varied from 0·4° to 4·8° F. In two instances the elevation was less than 1° F. In thirteen cases it lay between 1° and 1·9° F. In one case it was 2·8° F.; in three instances 3°, 3·4°, and 3·8° F. respectively, and one instance 4·8 F. One animal was tested with an emulsion composed of 50 mg. of avian tubercle bacilli in salt solution, the injection being intravenous. There was a rise of temperature of 2·4° F.

In one case the animal was simultaneously affected with tuberculosis, and in this instance the rise of temperature recorded was 1·6° F.

On nineteen occasions ophthalmic tests were carried out with concentrated human tuberculin. Negative reactions were obtained in five cases, doubtful or slight reactions in nine cases, and distinct reactions in five.

Intradermic tests carried out on two occasions with concentrated human tuberculin yielded a doubtful reaction in one case and a marked reaction in the other. Ophthalmic tests carried out with concentrated avian tuberculin yielded two negative results only.

The animal in which both tuberculosis and Johne's disease were found was not subjected either to the ophthalmic or the intradermic tests.

In the *Centralblatt für Bakteriologie Originale*, vol. lxvi., 1912, p. 316, Twort (C.C.) summarised briefly his experiments regarding the agglutinations and complement fixation reactions in animals experimentally infected with the bacillus of Johne's disease. The experiments were almost entirely confined to animals inoculated experimentally, cows, calves, sheep, goats, rabbits, and fowls being used. The cattle, sheep and goats were each inoculated once, intravenously, subcutaneously, or intraperitoneally. The rabbits and fowls received two inoculations.

In the complement fixation tests the Wasserman technique was followed, the complement being titrated each day.

Antigen was supplied in the form of an even suspension of dead bacilli in 0·85 per cent. sodium chloride solution, homogeneity of the emulsion being obtained by shaking with beads.

Antibodies could not be detected before the 2nd week.

A naturally infected bull gave positive reactions on three occasions, but the reactions tended to become less pronounced as the disease advanced. A naturally infected cow gave no reaction. A cow infected by feeding with culture gave a positive reaction, but on post-post-mortem was found to be tuberculous as well. Of six calves infected experimentally, only one gave a slight reaction three months later. Two goats and two sheep gave slight reactions only, six months after intravenous inoculation. Inoculated fowls yielded uniformly negative results, and nearly all the inoculated rabbits gave good reactions.

In carrying out agglutination tests the emulsion was allowed to stand for from twelve to twenty-four hours in an ice-chest before it was used, in order to allow of sedimentation of the coarser particles. Heating the sera for half-an-hour to 56° C. was found to partially or completely destroy the agglutinins, with the exception of those developed in the fowls.

Preliminary tests were carried out by mixing one drop of serum with four drops of emulsion and incubating the mixtures at body temperature for four hours.

Control preparations have to be kept under careful observation in order that the spontaneous agglutinations may be guarded against. This is said to be particularly likely to occur if living bacilli are used. It is said that the sera of most of the animals yielded negative results before they were inoculated with the bacilli. The naturally infected bull gave good positive reactions on three occasions in a dilution of 1 in 15. The naturally and perimentally infected cows gave moderate reactions. The six calves gave fair reactions three months after inoculation. The goats and sheep failed to react. The sera of some of the fowls gave the most marked reactions obtained.

In referring to comparative tests with different antigens, the author incidentally states that agar containing a glycerin extract of bacillus phlei did not appear to be suitable for the cultivation of the bacillus of Johne's disease. The degree of specificity was found to be very limited. In many instances the sera from infected animals showed no preference for the bacillus of Johne's disease.

Treatment.

M'Fadyean has recently published (*Journal of Comparative Pathology and Therapeutics*, 1914, vol. xxvii, No. 1) an account of the successful treatment of an infected animal. When the animal first came under observation it was greatly emaciated, and was suffering from profuse diarrhœa. Diagnosis was confirmed by Markus' method. The animal received daily one ounce of the following mixture in a pint of water :

Ferrous sulphate	5 ounces.
Dilute sulphuric acid	5 „
Water up to	1 pint.

The treatment was carried on for seven weeks with one interval of a week. The animal improved immensely in conditition, and a great increase in weight was registered. As the animal is still alive and in a thriving condition, it is impossible to say whether an actual cure has been effected or not. Evidence furnished by an ophthalmic test with concentrated human tuberculin suggests that the animal is also the subject of tuberculosis.

During the past three years further investigations regarding various aspects of Johne's disease have been in progress at the Royal Veterinary College, London, but at the time of writing these experiments do not permit of publication.

Pernicious Anæmia and Horse-sickness in South Africa.

When Sir Arnold Theiler returned from Europe towards the end of last year he found that the inoculation against horse-sickness was not proceeding as satisfactorily as could have been desired, and he consequently instructed that it should be stopped until he could ascertain the reason. At the time there were at Onderstepoort a considerable number of horses which had been "salted" in the course of the experiments. These Sir Arnold decided to dispose of, but, before doing so, he resolved to try an experiment. He wished to discover whether the virus from horses which had died from relapses would break the immunity of "salted" animals—in this case, animals which had been experimentally "immunised."

The result of this experiment was interesting; the virus taken from five horses which, though thought to be "salted," had suffered from apparent relapses, produced reactions upon being injected into "salted" animals.

Why was this? On the face of it, it seemed evident that cases of horse-sickness relapses were being dealt with, though the circumstances of the relapses were remarkable. To make sure, however, Sir Arnold had samples of virus from these affected animals tested, and then, to his surprise, he found that he was dealing with, not horse-sickness, but some new disease. In its acute stages, this disease somewhat resembled horse-sickness; yet in its sub-acute form it was not unlike biliary fever; and again in chronic cases the affected animals appeared to be suffering from some wasting disease, rapidly losing condition. Post-mortem examinations of acute cases showed lesions resembling those of biliary fever, but that this could not be the disease was shown by the absence of the specific parasites under the microscope.

Sir Arnold was able eventually to "place" the new disease: it was pernicious anæmia.

French and American investigators affirm that a horse which has suffered from pernicious anæmia never recovers, in spite of apparent improvements. Even during these periods of apparent health the blood is capable of producing the disease in healthy animals.

In the preventive inoculation against horse-sickness serum is used which is elaborated from the blood of horses. Now the virus both of horse-sickness and of pernicious anæmia is invisible, and the only means which exists of detecting its presence is the result of the inoculation. Consequently, in obtaining serum for horse-sickness inoculation, should an animal suffering from the chronic form of pernicious anæmia be chosen, the latter disease might easily be spread by the inoculation. It was for this reason that Sir Arnold Theiler decided to stop the horse-sickness inoculation for the present, until such time as he is able to make certain that the horses from which serum is obtained are not infected with pernicious anæmia. The diagnosis is long

and difficult, and so the manufacture of serum has been discontinued, but Sir Arnold hopes shortly to be in a position to recommence preventive inoculation against horse sickness.

There is, in Dr. Theiler's opinion, every possibility that in the past pernicious anæmia has been mistaken for horse-sickness, biliary fever, and other diseases. Great difficulties attach to its correct diagnosis; close observation over a long period is necessary, and it is only then that it is possible to arrive at a right conclusion.

Three forms or stages of the disease are recognised, the acute, the sub-acute, and the chronic. The first of these commences after an incubation period of from one to four weeks, and is accompanied by a fever which might last from eight to fourteen days. For a number of days the animal may have a temperature as high as 106. The patient refuses to eat and rapidly loses condition. There may be slight constipation, or signs of diarrhœa in the form of blood-stained fæces. The pulse is very rapid and the breathing becomes quickened and laboured towards the end. In the mucous membranes are to be found distinguishing symptoms. In the eye they may be slightly injected; and they will be observed to be of a light orange-yellow colour (whereas in the case of biliary fever they are bright yellow). The gums are pale. Sometimes odematous swellings appear in the belly and leg and other dependent parts of the body. Post-mortem examination reveals a yellow appearance throughout the whole body, and the muscles possess brownish discolouration. What seems to be a constant main symptom is a very swollen spleen and a brownish-yellowish enlarged liver. Blood spots, too, are found in many parts of the body, such as both inside and outside the heart, alongside the vertebral column, and on the membrane of the intestines. Hæmorrhagic inflammation of the kidneys may also be present, and blood spots in the bladder.

The sub-acute form of the disease shows itself in a series of two or three or even more attacks such as have been described. After each attack the temperature returns to the normal, and there is apparent recovery for a period of from eight days to three weeks, when another attack occurs. The animal may succumb during one of these attacks, or the disease may develop into the chronic form, or the animal may appear to recover. In the sub-acute form of pernicious anæmia the patient loses condition gradually, in spite of a fair appetite right through the attacks. Here, again, the temperature and the condition of the mucous membranes are the main guides to the diagnosis of the disease. The membranes marking the eyelids have a washed-out appearance, and may show ecchymoses. They are yellow in colour; and the gums are almost white. Post-mortem examination reveals lesions similar to those found in acute cases, but the general appearance is paleness instead of yellowishness. The liver and spleen are as in acute cases, but the other lesions are less marked.

In the chronic form of the disease the fever is remittent, lasting possibly a week or only a few days. The patient passes through periods of irregular length without any fever, varied with periods during which fever reappears. This may go on for months. Sometimes the animal wastes away to a skeleton and dies of inanition; whilst at other times the patient remains in fair condition. In the latter case there are apparent recoveries, but whether these are real is not known at present. Sir Arnold Theiler has had a good many such cases in which the fever has disappeared without any treatment; whilst in some of them there has been a return of fever lasting from two to five days, but without any of the other symptoms of the disease.

How the disease is transmitted is not yet known, but evidence points to insect parasities as the agency. So far it has not been found possible to transmit the disease experimentally to mules and donkeys, but no conclusions can yet be drawn from the experiments.

There is one reassuring point about the disease; in Sir Arnold's opinion it is not very infectious under natural conditions.—*South African Agric. Journal.*

OBITUARY

THACKERAY.—On Tuesday, Nov. 10, at 45 Wolverhampton Road, Stafford, Agnes Mary, the wife of Harry Thackeray, M.R.C.V.S. R.I.P.

ARMY VETERINARY SERVICE

Extract from *London Gazette*,

WAR OFFICE, WHITEHALL, Nov. 6.

Special Reserve of Officers.

ARMY VETERINARY CORPS.

R. C. G. Hancock to be Lieut. (on probation). Dated Oct. 9.

The following notification is substituted for that in the *Gazette* of Aug. 18:—

To be Lieuts: C. J. R. Lawreace, R. H. Knowles, J. G. T. Edwards, F. C. Minett,, R. Daubney, M. G. O'Connell. Dated Aug. 5.

P. T. Saunders. Dated Aug. 6.

H. J. Lowe. Dated Aug. 19.

TERRITORIAL FORCE. ARMY VETERINARY CORPS.

The following officers are appointed Assistant Directors of Veterinary Services to Territorial Divisions, and are granted temporary rank of Lieut.-Col.: Dated Nov. 7:—

Maj. J. K. Grainger (retired pay); Maj. A. H. Lane (Reserve of Officers); Maj. T. Marriott, F.R.C.V.S. (retired pay).

Nov. 9.

REGULAR FORCES. ARMY VETERINARY CORPS.

To be temporary Lieuts:—

F. W. Trydell. Dated Sept, 28.
T. H. Tranter. Dated Oct. 1.
T. A. I. Anderson. Dated Oct. 19.
W. G. Green. Dated Oct. 21.
J. Sherley, J. P. Stableford. Dated Oct. 22.
G. Ellis, J. Millward, G. H. Butcher. Dated Oct. 23.
W. F. Hughes, J. Blackburn. Dated Oct. 24.
J. Richardson. Dated Oct. 26.
R. Scott. Dated Oct. 30.
G. H. Pollock. Dated Nov. 10.

TERRITORIAL FORCE. ARMY VETERINARY CORPS.

Lieut. W. V. Tuson resigns commission on account of ill-health. Dated Nov. 10.

Nov. 10.

REGULAR FORCES. ARMY VETERINARY CORPS.

Temp. Lieut. A. O'Neill relinquishes his commission on account of ill-health. Dated Oct. 1.

Nov. 11.

REGULAR FORCE. ARMY VETERINARY CORPS.

T. W. 1. Gardiner to be temporary Capt. Dated Oct. 30.

R. W. Simpson to be temporary Lieut. Dated Oct. 30.

To be temporary Quartermasters, with hon. rank of Lieut.:—

J. H. Loane, C. Cooke, A. O. Hildyard, E. E. H. Armstrong, J. Mullane, J. F. Ives, T. F. Flood, W. J. Alderson, J. Wood, W. J. Willous, E. Boran. Dated Nov. 12.

TERRITORIAL FORCE. ARMY VETERINARY CORPS.

E. J. Lainé to be Lieut. Dated Nov. 12.

A QUESTION OF PRECEDENCE.

Sir,

In last week's *Veterinary Record* I saw a letter from the Officer Commanding South Midland Divisional Veterinary Hospital in which it was claimed that the South Midland Division was the first to raise a Divisional Veterinary Hospital.

No doubt a few of the first Territorial Force Veterinary Units to be raised, came into existence about the same time, still the one which seems to have been the first was that of the North Midland Division, which came into existence in April and was up to full strength at mobilization. I am afraid that the South Midland Division's claim to precedence. in view of what I have just stated cannot therefore be sustained.—Yours, etc.,

J. William Coe. Major.
Commanding North Midland Div. Vety. Hosp.

London, Nov. 11.

STAPHYLOCOCCUS AND STREPTOCOCCUS COMBINED VACCINE IN STRANGLES.

Sir,

There should be a ripe crop of veterinary articles presently for the professional journals as opportunities are numerous among those of us who are put in charge of hospitals. Others probably find, like myself, that there is no time for anything but the treatment and general supervision, which includes rationing men and horses and signing (more or less blind) for all sorts of stores and equipment and hearing of complaints (and receiving them for not performing miracles), and this will account for the present paucity of articles in your useful journal.

But it was not to grouse about the administrative duties which afflict me that I intended to write, but to say that I have treated 102 cases of irregular strangles with mixed staphylococci and streptococci (of Parke, Davis' preparation) with such excellent results as to feel confident in recommending their adoption. The clearing up of secondary abscesses and healing of fistulous wounds as a result of often one, and seldom more than two doses, at intervals of six or seven days, is simply wonderful.

The type of strangles has this year been severe. During the Boer War I had fully 400 cases of strangles on one ship, without any of these hang-fire types. They matured and, if not lanced at the right moment, broke and discharged satisfactorily; quite a different experience from cases treated here in England this year.—Yours truly,

H. Leeney, V.O. in Command.
(formerly Lieut. Hants Carabiniers).

Fund for the A.V.C. with the Expeditionary Force.

Collection for Mrs. Moore's Fund per Mrs. Mettam, R.V.C.I., Dublin (4th List).

	£	s.	d.
Previously acknowledged	58	2	6
F. S. Ringwood, Enniscorthy	1	1	0
Prof. A. Gofton, Edinburgh	2	2	0
T. I. Alexander, Kinsale	1	1	0
O. D. Neary, Dundalk		10	6
T. Salusbury Price, London	4	4	0
W. C. Barry, Cork	1	1	0
J. B. Dunlop, Dublin	2	2	0
P. D. Reavy, Bundoran, Donegal	1	1	0
Wm. Brown, Naas, Kildare	1	1	0
R. & J. Kernohan, Ballymena	1	0	0
Finlay Kerr, Dublin	1	1	0
Wm. Nyhan, Cahirciveen	1	0	0
J. McBirney, Kilkeel	1	1	0
F. A. Good, Bantry		10	6
Central Veterinary Association of Ireland	5	0	0
	£81	18	

BRITISH COLUMBIA VETERINARY ASSOCIATION.

At the annual meeting of the British Columbia Veterinary Association, held in Vancouver on the first of October, the amount of two hundred and fifty (250) dollars was donated to the general war relief fund. This action by the veterinarians of the province has created a very favourable impression, for although the organisation is a comparatively young one it has proven itself in this and other instances to be one of far-reaching usefulness; with its fields of endeavour by no means confined to the veterinary profession alone.

The officers elected for the current year are: President—Dr. S. F. Tolmie, Victoria, B.C.; Vice-President—Dr. J. W. Darby, Vancouver, B.C.; Secretary and Treasurer and Registrar—Dr. H. W. Jakeman, New Westminster, B.C.; Council: Drs. S. Ransam, T. H. Jagger, Geo. Howell, A. J. Damman, of Vancover, B.C.

H. W. Jakeman, Secretary.

—*Amer. Vet. Rev.*

Incidents at the Front.

Authentic extract from the letter of a Private in a mobile section A.V.C. at the Front.

"We billeted for the night at ——. During the night one of the Section posted as sentry fired on a supposed German who did not halt when challenged.

Early next morning a French farmer came and said that five German soldiers were eating in a farm a little way along the road. No other British troops were near so our Captain turned three of us out armed with rifles, and led us to the farm. We took the five Germans prisoners; they offered no resistance. We disarmed them and took them to our billet, searched them, and put a guard over them.

Within an hour of this the same farmer came along and told our Captain that 14 more Germans were coming across the fields of his farm. Our Captain again turned out the same three of us armed with rifles, but this time we were reinforced by six Army Service Corps men who had luckily just arrived with a motor wagon. The Captain led us along the road to where there was a wall. Behind this we took cover and waited till the Germans appeared. We covered them with our rifles and the Captain called on them to surrender. They at once threw down their rifles and surrendered, probably under the impression that we were the advance party of an infantry battalion. These persons were put with the others and shortly afterwards we handed them over to an empty Army Service Corps convoy passing through.'

Hunting Memorial Fund.

Subscriptions received up to 7 p.m., Nov. 11th, 1914.

	£	s.	d.
Amount previously acknowledged	348	12	0
Per Prof. Woodruff, The Veterinary School, The University, Parkville, Melbourne:			
W. T. Kendall, Esq., D.V.SC., M.R.C.V.S.	1	1	0
Capt. Norman Macdonald, B.V.SC.	1	1	0
E. F. T. Bordeaux, Esq., B. ès L., B.V.SC.	1	1	0
Thomas Bell, Esq., M.R.C.V.S.	1	1	0
H. A. Woodruff, Esq., M.R.C.V.S., M.R.C.S., L.R.C.P.	1	1	0
Total	£353	17	0

Remittances to be made payable to the "Hunting Memorial Fund," and crossed "The London, City, and Midland Bank, Ltd., Kensington Branch."

Henry Gray, Hon. Sec. & Treas.
23 Upper Phillimore Place,
London, W. Nov. 11.

DISEASES OF ANIMALS ACTS 1894 TO 1911, SUMMARY OF RETURNS.

Period.	Anthrax		Foot-and-Mouth Disease.		Glanders.†		Parasitic Mange. ‡		Sheep Scab.	Swine Fever.	
	Outbreaks (a)	Animals.	Outbreaks (a)	Animals.	Outbreaks (b)	Animals.	Outbreaks (b)	Animals.	(b)	Outbreaks (a)	Slaughtered. *
GT. BRITAIN. Week ended Nov. 7	11	11			1	3			6	88	540
Corresponding week in 1913 ...	17	17			3	3	20	55	6	50	364
Corresponding week in 1912 ...	9	9			4	4	27	32	9	56	732
Corresponding week in 1911 ...	18	21			5	12			8	32	357
Total for 45 weeks, 1914	631	690	24	125	87	268	1563	2699	165	3770	36049
Corresponding period in 1913 ...	475	524			133	325	2123	4213	154	2160	28014
Corresponding period in 1912 ...	659	741	82	639	158	292	2529	5349	217	2584	35109
Corresponding period in 1911 ...	761	938	18	467	195	443			331	2146	25750

(a) Confirmed. (b) Reported by Local Authorities. † Counties affected, animals attacked: London 3.
Board of Agriculture and Fisheries, Nov. 10, 1914

IRELAND. Week ended Nov. 7	...	...	...	...	...	...	Outbreaks 1	6	2	16
Corresponding Week in 1913 ...	...	...	...	...	...	...	1	7	...	7
Corresponding Week in 1912 ...	...	...	2	8	...	...	1	14	2	7
Corresponding Week in 1911 ...	1	1	...	...	...	...	...	4	7	108
Total for 45 weeks, 1914 ...	1	1	76	955	...	...	72	440	180	891
Corresponding period in 1913 ...	...	...	...	...	1	1	111	436	126	829
Corresponding period in 1912 ...	3	3	68	382	...	...	58	304	304	1610
Corresponding period in 1911 ...	8	15	...	...	2	3	53	287	122	2109

‡ The Parasitic Mange Order of 1911 has been suspended as from 6th August.
Department of Agriculture and Technical Instruction for Ireland, (Veterinary Branch), Dublin, Nov. 9, 1914
NOTE.—The figures for the Current Year are approximate only. * As Diseased or Exposed to Infection

The Duck and Larvæ and Pupæ of Mosquitoes.

Dr. S. G. Dixon, Commissioner of Health of the Commonwealth of Pennsylvania, has recently pointed out that the duck is one of the greatest enemies of the mosquito, and therefore can play an important part in the prevention of malaria and yellow fever. After trying the ability of fish to devour the larvæ and pupæ of mosquitoes with varied success, he built two dams near one another on a stream, so that they gave exactly similar breeding grounds for mosquitoes. In one 20 mallard ducks were allowed to breed. The other was protected from water fowl, but well-stocked with goldfish. The one remained for several months entirely free from mosquitoes, while the other swarmed with them in different cycles of life. To the infested pond ten well-fed mallard ducks were admitted. At first they were attracted by the tadpoles, but they soon noticed the larvæ and pupæ of the mosquitoes and ravenously devoured them in preference to any other food. After 24 hours no pupæ could be found, and after 48 hours only a few small larvæ. The motion of the water produced by the ducks of course drowned some of the insects, what proportion could not be estimated. For some years Dr. Dixon has been using ducks to keep down mosquitoes in swamps that would have been expensive to drain, but he never appreciated their efficiency until he made these experiments. In the work of Howard, Dyar, and Knab on "Mosquitoes of North and Central America and the West Indies" is an essay on the destruction of the mosquito and house-fly by Mr. W. Beutenmueller, who expresses the view that aquatic birds could be used for the purpose of destroying mosquito larvæ. Mr. W. Lockwood, of Boston, who has made a hobby of raising aquatic fowl, thinks that the spoon-billed duck is particularly adapted to the destruction of larvæ resting on the surface of water. While other birds, fish, spiders, batrachians, arthropods, and reptiles are all enemies of the mosquito, Dr. Dixon claims that none have the wide geographical range and the capacity of the duck for devouring large numbers of the larvæ and pupæ. Ducks can be used in ponds, swamps, both open and in jungles, and can be driven from place to place.

We may point out that fish are being used for the destruction of mosquito larvæ with greater success than appears to have been obtained by Dr. Dixon. In Gambia a constant reserve of fish is maintained in some of the drains at the sea end, even in the dry season, and as required fish are transferred to other drains and private wells. More and more people are having their wells stocked with fish, and this measure proves more efficient than well covers, which must be frequently removed. Fish from the sea introduced into comparative fresh water take some time to adapt themselves to it, but after a day or two become brisk and destroy larvæ with avidity. The number which can be destroyed is shown by the following sanitary report. A drain which had been dry for some time filled up to 90 yards from the sluice gate during high tides in April, the average depth being 4 inches. On April 23rd larvæ half-grown and over were present to the number of 2100. Eleven fish averaging 4 inches long and 5 averaging 2 inches, which had been kept some time in fresh water, were introduced at 11 a.m. Close inspection at 9 a.m. on the following morning did not show a single larva.—*The Lancet.*